6450-01-P

DEPARTMENT OF ENERGY

Creating a Robust Accelerator Science & Technology Ecosystem

AGENCY: Office of Accelerator R&D and Production, Office of Science, Department of Energy (DOE).

ACTION: Request for information (RFI).

SUMMARY: The Office of Accelerator R&D and Production, as DOE's coordinating office for accelerator R&D to support the Office of Science research mission, is requesting information on the current state of the accelerator technology market, and for information about successful public-private-partnership models.

DATES: Written comments and information are requested on or before [**INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***].

ADDRESSES: Interested persons may submit comments by email only. Comments must be sent to *ARDAPRFI@science.doe.gov* with the subject line "Accelerator RFI Comments".

FOR FURTHER INFORMATION CONTACT:

Dr. Eric R. Colby, (301) 903-5475, *Eric.Colby@science.doe.gov*.

SUPPLEMENTARY INFORMATION:

The Challenge: Particle Accelerators and closely related technologies play a key role in the discovery sciences, including Basic Energy Sciences, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics. Modern discovery science accelerators are high technology instruments of remarkable complexity, having advanced over eight orders of magnitude in energy since their invention. Aggressive reinvention of the underlying technology has driven improvements in this science and has required sustained investment in accelerator science R&D that advances the methods, materials, and understanding of accelerator science. National Laboratories, academia, and industry each play vital, mutually reinforcing roles in the success of the accelerator-based discovery sciences. They provide a pipeline of scientific and technological

advances and corresponding accelerator-component production capability, both necessary to sustain U.S. leadership in this area. With an estimated 30,000 particle accelerators operating worldwide, there is a significant and growing need[1] for a technically proficient industrial base that can provide the increasingly high technology components for modern accelerators. Reductions in federally funded long-term accelerator R&D over the past decade, coupled with marginal domestic markets for accelerator technologies have resulted in weakening of the domestic accelerator technology production capability.

The Response: The U.S. Department of Energy, acting through the Office of Accelerator R&D and Production in the Office of Science, is gathering information on the state of the accelerator technology ecosystem, and on future investments that would be of mutual benefit to both DOE's physical sciences research mission and to industry.

For the purposes of this Request for Information, Accelerator Technology encompasses the materials, components, subsystems, and integrated accelerator systems needed for modern accelerators. This includes accelerator structures (both room temperature and superconducting); high power radio frequency sources and transmission components; high efficiency high-voltage pulsed-power systems; high precision accelerator magnets (both conventional and superconducting); high power laser systems; high brightness sources of electrons, protons, and ions; high power targets for secondary beam generation; precision x-ray optics; particle and radiation detectors, and advanced accelerator concepts. It also includes materials such as superconducting sheet, wire, and cable; permanent magnet materials; materials for laser and x-ray optics and coatings; photocathode materials and structures for polarized electron sources; and materials for particle detectors.

The transfer of high technology from academic and research use into industrialized production for broader use is a vital step towards reducing cost and increasing reliability of particle

[1] "Accelerators for America's Future", workshop report, *http://science.energy.gov/~/media/hep/pdf/accelerator-rd-stewardship/Report.pdf* , (2009).

accelerators generally. Collaborative models of accelerator R&D, public-private partnerships, cooperative research and development agreements, Small Business Innovation Research programs, and industrial R&D are but a few of the critical mechanisms that move technology from concept to practice.

Request for information: The objective of this request for information is to gather information about the current marketplace of particle accelerator technology, and to explore opportunities, possible partnerships, and mechanisms to strengthen the domestic supply chain.

The questions below are intended to assist in the formulation of comments and should not be considered as a limitation on either the number or the issues that may be addressed in such comments. A summary of the comments provided will be made public.

The DOE Office of Accelerator R&D and Production is specifically interested in receiving input pertaining to any of the following questions:

Status and Future of the Market

1. What are the current industrial applications of particle accelerators and closely related accelerator technologies (see previous description)? What is the approximate size of these markets?
2. What are the emergent industrial applications of particle accelerators and closely related technologies?
3. Are there specific aspects of the current market that pose challenges to maintaining a viable accelerator technology business?
4. Are there specific aspects of the current market that inhibit technology transfer and/or the introduction of new accelerator technologies?

Models for Technology Transfer

5. What mechanisms are currently in use to transfer technology innovations to industrial practice in your technology area?
    a. What aspects of these mechanisms are effective?

b. What opportunities exist to improve these mechanisms?

c. How widely known or easily accessible are these mechanisms?

6. Can you describe previous examples of successful technology R&D partnerships or mechanisms? Why, specifically, were these partnerships or mechanisms successful?
7. Can you describe examples of failed technology partnerships or mechanisms? Why, specifically, did these attempts fail?
8. Are there new models of technology transfer that should be explored?

Workforce Development

9. Do present training mechanisms such as SULI[2], post-baccalaureate programs in accelerator science & engineering, Traineeship Programs[3], USPAS[4], and the Energy I-Corps[5] meet the workforce needs for industry, academia, and the national laboratories?

    a. What aspects of current training mechanisms could be improved?

    b. What additional mechanisms could be used to improve overall workforce expertise and readiness?

Defining an Optimal Federal Role

10. What mix of institutions (industrial, academic, lab, government) could best carry out the required technology transfer R&D, and who should drive the R&D?
11. What collaboration models would be most effective for pursuing joint technology R&D?
12. How could accelerator technology R&D efforts engage with other innovation and manufacturing initiatives, such as Manufacturing USA[6]?
13. At what point in the technology transfer and subsequent manufacturing development cycle would federal support no longer be needed?
14. How best can integrated production know-how for niche market technologies be preserved

---

[2] *https://science.osti.gov/wdts/suli*
[3] *https://uspas.fnal.gov/opportunities/educational-opps/DOE-traineeships.shtml*
[4] *https://uspas.fnal.gov/index.shtml*
[5] *https://energyicorps.energy.gov/*
[6] See *https://www.manufacturingusa.com/ for a program description*.

once high-quality sustainable production has been achieved?

15. What metrics should be used to assess the progress of an accelerator technology transfer effort over the short term (e.g., 1-2 years) and long term (e.g., 5 years or more)?

Other Factors

16. Are there other factors, not addressed by the questions above, that impact the successful transfer and industrialization of accelerator technology?

Depending on the response to this RFI, a subsequent workshop may be held to further explore and elaborate the opportunities.

Signing Authority

This document of the Department of Energy was signed on January 25, 2021, by J. Stephen Binkley, Acting Director, Office of Science, pursuant to delegated authority from the Acting Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on January 26, 2021.

Treena V. Garrett,

Federal Register Liaison Officer,

U.S. Department of Energy.

[FR Doc. 2021-01959 Filed: 1/28/2021 8:45 am; Publication Date: 1/29/2021]